

Claims:

1. A pneumatic device configured to supply pressurized air, the pneumatic device comprising
 - a plurality of pneumatic supply lines,
 - 5 a plurality of pneumatic receiving lines configured to receive pressurized air from the plurality of pneumatic supply lines,
 - a pneumatic coupling configured to couple and uncouple the plurality of pneumatic receiving lines from the plurality of pneumatic supply lines, the pneumatic coupling including a two-piece housing, a plurality of supply line fittings 10 configured to receive the plurality of pneumatic supply lines, a plurality of receiving line fittings configured to receive the plurality of pneumatic receiving lines, and an over-center latch configured to couple the two-piece housing together, the two-piece housing including a pair of identical housings, each identical housing including a plurality of channel bodies defining channels sized to receive the plurality of supply 15 and receiving line fittings and a plurality of parallel ribs coupled to the channel bodies, each of the ribs having a cantilevered portion extending away from at least one of the channel bodies, the channels having an exterior end and an interior end, the plurality of supply and receiving pneumatic lines being positioned within the exterior ends of the channels, the interior ends of the channels of one of the identical housings 20 being positioned adjacent to the interior ends of the channels of the other identical housing, each of the plurality of supply and receiving line fittings being sized for insertion through the interior ends of the channels to couple with at least one of the supply and pneumatic receiving lines, the over-center latch being configured to couple the cantilevered portions of the ribs of one of the identical housings to the cantilevered 25 portions of the ribs of the other identical housing to separably couple the two-piece housing together.
2. A pneumatic coupling configured to couple a plurality of pneumatic lines, the pneumatic coupling comprising
 - a first housing having at least one aperture sized to receive a first 30 pneumatic line of the plurality of the pneumatic lines,

a second housing having at least one aperture sized to receive a second pneumatic line of the plurality of pneumatic lines, and

5 a coupler configured to couple the second housing to the first housing to couple the first and second pneumatic lines in fluid communication, the coupler including a link pivotably coupled to the first housing and a latch member pivotably coupled to the link and configured to couple the second housing to the first housing.

10 3. The pneumatic coupling of claim 2, wherein the first housing includes a plurality of apertures sized to receive a plurality of pneumatic lines and the second housing includes a plurality of apertures sized to receive a plurality of pneumatic lines.

15 4. The pneumatic coupling of claim 2, further comprising another coupler configured to couple the first housing to the second housing to couple the first and second pneumatic lines in fluid communication and including a link pivotably coupled to the second housing and a latch member pivotably coupled to said link and configured to couple to the first housing to couple the first housing to the second housing.

5. The pneumatic coupling of claim 2, wherein the latch member is movable between an unlatched position and to an over-center position where it is urged to a latched position.

20 6. The pneumatic coupling of claim 2, wherein the latch member is movable between first, second, and third positions, the first and second housings are coupled together and the first and second pneumatic lines are in fluid communication when the latch member is in the first position, the first and second housings are spaced apart and the first and second pneumatic lines are unsealed when the latch 25 member is in the second position, the latch member restrains movement of the second housing relative to the first housing when in the second position, the latch member is spaced apart from the second housing when in the third position to permit unrestrained movement of the second housing relative to the first housing.

30 7. A pneumatic coupling configured to couple a plurality of pneumatic lines, the pneumatic coupling comprising

a first housing adapted to receive a first pneumatic line of the plurality of pneumatic lines, and

5 a second housing adapted to receive a second pneumatic line of the plurality of pneumatic lines, the second housing being movable relative to the first housing between a first position coupled to the first housing and second position coupled to the first housing, when the second housing is in the first position, the first and second pneumatic lines are in sealed fluid communication permitting air to flow therebetween, when the second housing is in the second position, the first and second pneumatic lines are unsealed permitting air from the first pneumatic line to flow 10 externally of the first and second pneumatic lines.

8. The pneumatic coupling of claim 7, wherein the second housing is movable to a third position uncoupled from the first housing and unrestrained relative to the first housing.

9. The pneumatic coupling of claim 7, wherein the first housing is 15 adapted to receive a plurality of pneumatic lines including the first pneumatic line, the second housing is adapted to receive a plurality of pneumatic lines including the second pneumatic line, the plurality of pneumatic lines received by the first housing are in sealed fluid communication with the plurality of pneumatic lines received by the second housing when the second housing is in the first position.

20 10. The pneumatic coupling of claim 9, further comprising a plurality of fittings configured to receive the pneumatic lines received by the first and second housings.

25 11. A pneumatic device comprising a first pneumatic component configured to receive pressurized air, a second pneumatic component configured to receive pressurized air, and

30 a pneumatic coupling configured to couple the first pneumatic component to the second pneumatic, the pneumatic coupling being configured to move from a first position with the first and second components fluidly coupled to permit the flow of pressurized air from the first pneumatic component to the second

5 pneumatic component and a second position with the first and second pneumatic components fluidly uncoupled to permit the flow of pressurized air from the first pneumatic component to a location external of the first and second pneumatic components, the second pneumatic component being restrained from moving beyond a predetermined distance from the first pneumatic component when the pneumatic coupling is in the second position.

10 12. The pneumatic device of claim 11, wherein the first pneumatic component is a pneumatic line and the second pneumatic component is a pneumatic lines in fluid communication with the first pneumatic line when the pneumatic coupling is in the first position.

13. The pneumatic device of claim 11, wherein the pneumatic coupling includes first and second housings and a coupler configured to couple the first and second housings together.

14. The pneumatic device of claim 13, further comprising a first plurality of pneumatic lines and a second plurality of fluid lines, the first pneumatic component is a pneumatic line included in the first plurality of pneumatic lines, the second pneumatic component is a pneumatic line included in the second plurality of pneumatic lines, the first housing is configured to receive the first plurality of fluid lines, the second housing is configured to receive the second plurality of fluid lines, the first and second plurality of pneumatic lines being in sealed fluid communication when the pneumatic coupling is in the first position.

15 15. The pneumatic device of claim 14, wherein the first and second plurality of pneumatic lines are simultaneously sealed together when the pneumatic coupling moves to the first position and simultaneously unsealed when the pneumatic coupling moves to the second position.

16. A pneumatic device comprising
30 a first pneumatic component configured to receive pressurized air,
a second pneumatic component configured to receive pressurized air, and
a two-stage pneumatic coupling configured to move between a first
coupled position, a second coupled position, and a third uncoupled position, the first

and second pneumatic components being coupled together and in sealed fluid communication when the two-stage pneumatic coupling is in the first coupled position, the first and second pneumatic components being coupled together and unsealed when the two-stage pneumatic coupling is in the second coupled position,
5 the first and second pneumatic components being uncoupled when the two-stage pneumatic coupling is in the uncoupled position.

17. The pneumatic device of claim 16, wherein the pneumatic coupling includes first and second housings and a coupler configured to couple the first and second housings together, the first housing is configured to receive the first
10 pneumatic component, the second housing is configured to receive the second pneumatic component, the first and second housings are spaced apart and coupled together by the coupler when the two-stage pneumatic coupling is in the second position.

18. The pneumatic device of claim 17, wherein the coupler is an
15 over-center latch configured to couple the first and second housings together.

19. A pneumatic coupling configured to couple a plurality of pneumatic lines, the pneumatic coupling comprising
a housing adapted to receive the plurality of pneumatic lines, the housing including an interior region and a plurality of exterior edges defining a plurality of apertures sized to receive the plurality of pneumatic lines, the plurality of edges defining a minimum width across the plurality of apertures, and
20 the portions of the plurality of fittings having a maximum width that is greater than
25 the minimum width of the corresponding aperture of the housing.

20. The pneumatic coupling of claim 19, wherein the housing includes a plurality of fitting-receiving channels positioned adjacent to the plurality of exterior edges defining the plurality of apertures, each fitting includes a plug member positioned in one of the fitting-receiving channels, a seal positioned between the plug

member and one of the plurality of pneumatic lines extending through one of the plurality of apertures of the housing, a pneumatic line clamp positioned between said pneumatic line and the fitting-receiving channel, a tube support positioned in an end of said pneumatic line, a clamp actuator extending through said aperture and positioned to engage the pneumatic line clamp, and an O-ring positioned to seal with a plug member of an oppositely positioned fitting.

21. The pneumatic coupling of 19, wherein the housing includes a first housing and a second housing separable from the first housing, the first and second housings include a plurality of channels sized to receive the plurality of fittings, the plurality of fittings includes a plurality of first fittings positioned in the channels of the first housing and adapted to seal with a plurality of pneumatic lines extending into the first housing, and the plurality of fittings includes a plurality of second fittings positioned for sealed contact with the plurality of first fittings and adapted to seal with a plurality of pneumatic lines extending into the second housing.

15 22. A pneumatic coupling configured to couple a plurality of pneumatic lines, the pneumatic coupling comprising
an exterior housing adapted to receive the plurality of pneumatic lines, the housing including an interior region and a plurality of apertures sized to receive the plurality of pneumatic lines,

20 a plurality of fittings positioned in the interior region of the external housing and adapted to receive the plurality of pneumatic lines, and
an interior housing positioned in the interior region of the external housing and configured to align the plurality of fittings with the plurality of apertures in the exterior housing to receive the plurality of pneumatic lines.

25 23. The pneumatic coupling of claim 22, wherein the exterior housing is made of a metal.

24. The pneumatic coupling of claim 23, wherein the exterior housing is made of aluminum.

30 25. The pneumatic coupling of claim 23, wherein the interior housing is made of a plastic material.

26. The pneumatic coupling of claim 25, wherein the interior housing includes a plurality of fitting-receiving channels and the plurality of fitting are positioned in the fitting-receiving channels.

27. The pneumatic coupling of claim 26, wherein the exterior 5 housing includes first and second separable housings configured to be removably coupled together and the interior housing includes first and second separable housings, the first and second housings have the plurality of fitting-receiving channels formed therein, the plurality of fitting-receiving channels formed in the first housing of the interior housing align with the plurality of fitting-receiving channels formed in 10 the second housing of the interior housing.

28. A pneumatic coupling configured to couple a plurality of pneumatic components, the pneumatic coupling comprising
a housing configured to receive a plurality of pneumatic components and fluidly couple first and second pneumatic components of the plurality of 15 pneumatic components together, the housing including a plurality of parallel ribs defining a plurality of grooves therebetween.

29. The pneumatic coupling of claim 28, wherein the housing further includes a plurality of channel bodies coupled to the plurality of ribs, the channel bodies cooperate to define a plurality of channels sized to receive the first and 20 pneumatic components.

30. The pneumatic coupling of claim 29, further comprising a plurality of pneumatic line fittings, wherein the plurality of pneumatic line fittings are positioned in the channel bodies and cooperate to provide fluid communication between the first and second pneumatic components.

25 31. The pneumatic coupling of claim 30, wherein the channel bodies and the ribs cooperate to define a plurality of apertures in the housing.

32. The pneumatic coupling of claim 31, wherein the housing includes identical half portions that are separable from one another.

30 33. The pneumatic coupling of claim 32, wherein each identical half portion includes a plurality of rib portions extending away from the channel

bodies, the pneumatic coupling further comprising a coupler configured to couple the plurality of rib portions of each half portion of the housing together to couple the identical half portions of the housing together.

34. A pneumatic device comprising

5 a first pneumatic coupling configured to couple a plurality of pneumatic supply lines to a plurality of pneumatic receiving lines, and

10 a second pneumatic coupling configured to couple a plurality of pneumatic supply lines to a plurality of pneumatic receiving lines, the first and second pneumatic couplings being configured to couple together.

15 35. The pneumatic device of claim 34, wherein the first and second pneumatic couplings include a housing and a plurality of fittings, the plurality of fittings are adapted to receive the plurality of pneumatic supply and receiving lines, the housings include a plurality of channels sized to receive the plurality of fittings, the housing of the first pneumatic coupling includes a first complementary member,

20 the housing of the second pneumatic coupling includes a second complementary member, the first and second complementary members couple together to couple the first pneumatic coupling to the second pneumatic coupling.

36. A method of coupling and uncoupling first and second pneumatic components using a pneumatic coupling, the method comprising the steps

25 of

coupling the first pneumatic component to the second pneumatic component using the pneumatic coupling so that the first and second pneumatic components are in sealed fluid communication,

30 unsealing the first pneumatic component from the second pneumatic component by permitting movement of the second pneumatic component relative to the first pneumatic component,

35 restraining movement of the second pneumatic component beyond a predetermined location relative to the first pneumatic component with the pneumatic coupling after the unsealing step, and

uncoupling the first pneumatic component from the second pneumatic component so that the movement of the second pneumatic component is no longer restrained by the pneumatic coupling.

37. The method of claim 36, wherein the coupling, unsealing, and 5 restraining steps are provided by an over-center latch.

38. The method of claim 36, wherein the coupling step provides fluid communication between a plurality of pneumatic supply lines and a plurality of pneumatic receiving lines.

39. The method of claim 38, wherein the unsealing step releases 10 pressure in the pneumatic supply and receiving lines.

40. A method of assembling a pneumatic device comprising the steps of

providing a pneumatic coupling including a housing and a fitting, the housing defining an interior region and an exterior aperture, and

15 inserting the fitting into the interior region of the housing to a position aligned with the exterior aperture.

41. The method of claim 40, wherein the inserting step includes positioning a first portion of the fitting adjacent to the exterior aperture and inserting a second portion of the fitting through the exterior aperture to couple with the first 20 portion of the fitting.

42. The method of claim 41, wherein the a portion of the housing is sandwiched between the first and second portions of the fitting.

43. The method of claim 40, wherein the housing includes a plurality of exterior apertures and a plurality of fitting-receiving channels having a 25 first ends positioned adjacent to the exterior apertures and a second ends spaced apart from the first ends, the providing step further includes providing a plurality of fittings, the inserting step further includes positioning at least first portions of the plurality of fittings in the plurality of fitting-receiving channels through the second ends.

44. The method of claim 43, wherein the housing includes a first 30 housing including a first plurality of the plurality of exterior apertures and a first

plurality of the plurality of fitting-receiving channels, and a second housing including a second plurality of the plurality of exterior apertures and a second plurality of the plurality of fitting-receiving channels that are opposed to and aligned with the first plurality of fitting-receiving channels, the inserting step includes inserting a first plurality of the plurality of fittings into the first plurality of fitting-receiving channels and inserting a second plurality of the plurality of fittings into the second plurality of fitting-receiving channels.

45. The method of claim 44, wherein the providing step further includes providing a plurality of pneumatic supply lines and pneumatic receiving lines, further comprising the step of coupling the plurality of pneumatic supply lines to the first plurality of fittings and coupling the plurality of pneumatic receiving lines to the second plurality of fittings.

46. The method of claim 45, further comprising the step of coupling the first housing to the second housing to provide fluid communication between the pneumatic supply and receiving lines through the first and second plurality of fittings.